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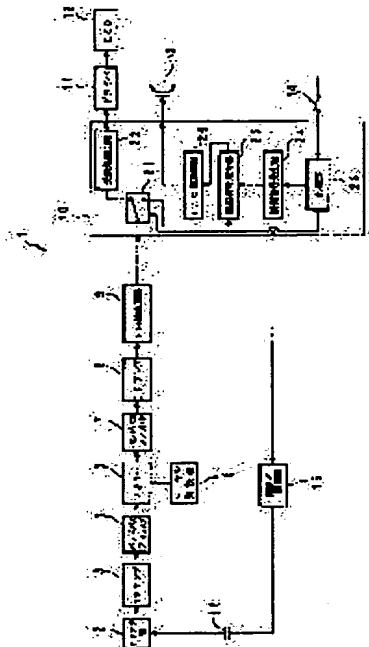
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### (54) RADIO RECEIVER



**(57)Abstract:**

**PURPOSE:** To provide the radio receiver which self-diagnoses the reception function.

**CONSTITUTION:** When a self-diagnosis switch 14 is closed, a control part 23 outputs a switching signal to a switch 21 to connect an FM detection circuit 9 to a pseudo code collator 25, and a pseudo code generator 24 is made to generate a pseudo code, and it is outputted to the pseudo code collator 25 and an oscillator/modulator 15. The modulated wave generated by the oscillator/modulator 15 is inputted to an antenna part 2, and the reception signal received by the antenna part 2 is amplified and detected and is inputted from an FM detection circuit 9 to the pseudo code collator 25. The pseudo code collator 25 compares the reception signal and the pseudo code from the pseudo code generator 24 with each other; and if the reception signal is normally received and the reception signal and the pseudo code coincide with each other, a speaker 13 is driven through an I/O driving circuit 26 to output a report tone.

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## CLAIMS

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[Claim(s)]

[Claim 1] In the radio set which reports the purport which had reception when the call number which received with the antenna, and the self call number registered beforehand were in agreement A generating means to generate a false signal, and a modulation means to modulate the false signal generated with said generating means, An input means to input into the antenna section the false signal modulated with said modulation means, The radio set characterized by having a comparison means to compare the false signal generated with said generating means with the false signal received through said antenna section by said input means, and an information means to report when it judges that said two false signals of said comparison means correspond.

[Claim 2] The radio set characterized by having a generating means to generate the modulated wave of a self call number in the radio set which reports a purport with reception when the call number which received with the antenna, and the self call number registered beforehand are in agreement, and an input means to input into the antenna section the modulated wave of the call number generated with said generating means.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to a radio set and relates to the radio set which equipped the detail with the self-checking function.

[0002]

[Description of the Prior Art] As a radio set which reports the purport received when the self call number registered beforehand and a call number in agreement were received, although there are various things, the case a company not only gives a pager as an object for the telephone contact from a business manager's going-out place, but where an individual uses it as an easy

communication tool since the toll is cheap compared with a land mobile radiotelephone or a cellular phone is increasing rapidly especially.

[0003] Conventionally, in a radio set like a pager, it is a power-source intermittent control action, and if reception actuation is repeated and a call number is received, the call number which received is compared with the self call number beforehand registered into the pager. And coincidence of the call number which received, and a self call number reports a purport with reception by lighting or vibration of an information sound and an annunciator.

[0004]

[Problem(s) to be Solved by the Invention] However, if it is in such a conventional radio set Since it did not have the function to perform a self-test about whether a purport with reception is reported and the reception function is operating normally when a self call number and a call number in agreement were received, Whether the reception function of a radio set is operating normally can only check carrying out normal actuation only after there is the usual reception, and it was not able to check positively whether the reception function of a radio set would be normal. Consequently, he has not noticed that a reception function is not normal, but there was a problem that important information was unreceivable.

[0005] Then, this invention aims at offering the radio set which can carry out the self-test of whether a reception function is normal.

[0006]

[Means for Solving the Problem] In the radio set which reports the purport which had reception when the call number which received with the antenna, and the self call number of an according to claim 1 radio set registered beforehand corresponded A generating means to generate a false signal, and a modulation means to modulate the false signal generated with said generating means, An input means to input into the antenna section the false signal modulated with said modulation means, The above-mentioned purpose is attained by having a comparison means to compare the false signal generated with said generating means with the false signal received through said antenna section by said input means, and an information means to report when it judges that said two false signals of said comparison means correspond.

[0007] Moreover, the radio set according to claim 2 has attained the above-mentioned purpose by having had a generating means to generate the modulated wave of a self call number, and an input means to input into the antenna section the modulated wave of the call number generated with said generating means, in the radio set which reports a purport with reception, when the call number which received with the antenna, and the self call number registered beforehand are in agreement.

[0008]

[Function] According to invention according to claim 1, a false signal is generated with a generating means, this generated false signal is modulated, and it inputs into the antenna section. It will report, if the false signal inputted into this antenna section is compared with the false signal generated with the generating means and these two false signals are in agreement.

[0009] Therefore, the self-test of whether the reception function of a radio set is simply normal can be carried out by the false signal, and important information can be received certainly.

[0010] Moreover, since according to invention according to claim 2 the modulated wave of a self call number is generated and the modulated wave of this call number of the generated self can be inputted into the antenna section, the self-test of whether the reception function of a radio set is normal can be carried out with an easy configuration.

[0011]

[Example] Hereafter, the example of the radio set of this invention is explained based on a drawing.

[0012] Drawing 1 - drawing 3 are drawings showing one example of the radio set of this invention, and this example is applied to a pager.

[0013] First, a configuration is explained.

[0014] Drawing 1 is the circuit block diagram of the pager which applied one example of the radio set of this example of this invention.

[0015] In drawing 1 a pager 1 The antenna section 2, RF amplifier 3, a band pass filter 4, a mixer 5, the local oscillator 6, a band pass filter 7, IF amplifier 8, the FM detector circuit 9, the signal-processing section 10, a driver 11, LCD (Liquid CrystalDisplay)12, a loudspeaker 13, It has the self-test switch 14, the oscillation/modulator 15, and the capacitor 16 grade, and the signal-processing section 10 is equipped with the change-over machine 21, the reception circuit 22, the control section 23, the false-signal generator 24, the false-signal collating machine 25, and the I/O drive circuit 26 grade.

[0016] RF amplifier 3 takes out and amplifies the alternating current component of an input signal received in the antenna section 2, and outputs it to a band pass filter 4.

[0017] In a band pass filter 4, the so-called signal component of interference frequencies other than the wave frequency of choice is removed from the amplified current signal which is inputted, and it outputs to a mixer 5.

[0018] While the input signal from the above-mentioned band pass filter 4 is inputted into a mixer 5, the local signal of the predetermined frequency which the local oscillator 6 oscillates is inputted, and a mixer 5 mixes an input signal and a local signal, and outputs them to a band pass filter 7.

[0019] A band pass filter 7 passes only an intermediate frequency signal out of two or more mixed signals inputted, and is outputted to IF amplifier 8.

[0020] IF amplifier 8 amplifies the mixed signal inputted from a band pass filter 7, and outputs it to the FM detector circuit 9.

[0021] The FM detector circuit 9 detects FM component which is a receiving signal component from the mixed signal inputted from IF amplifier 8, and outputs it to the change-over machine 21 of the signal-processing section 10.

[0022] Change-over control is carried out by the control section 23, and the change-over machine 21 switches the FM detector circuit 9 to the reception circuit 21 and the false-signal collating machine 25 alternatively, and connects. The change-over machine 21 will connect the FM detector circuit 9 to the false-signal collating machine 25, if the FM detector circuit 9 is connected to the reception circuit 22 and a change-over signal is usually inputted from a control section 23. Therefore, the input signal detected in the FM detector circuit 9 at the time of the usual reception is inputted into the reception circuit 22 through the change-over machine 21.

[0023] The decoder section in which the reception circuit 22 decodes an input signal, ID-ROM which memorizes a self call number, The call number which is an input signal which the decoder section decoded is compared with the self call number memorized by ID-ROM. Perform reception or It has RAM which memorizes the message which received with the control section and call number which perform control at the time of reception, and if reception is performed, the signal which directs a display to that effect and the received display of a message will be outputted to a driver 11 with an indicative data.

[0024] A driver 11 outputs the indicative data inputted from the reception circuit 22 to LCD12, and carries out the display output of the indicative data to LCD12.

[0025] In addition, you may make it the reception circuit 22 tell a purport with reception by driving a loudspeaker 13 and making an information sound it not only to display a purport with reception on LCD12, but output at the time of reception.

[0026] On the other hand, the false-signal generator 24 of the signal-processing section 10 outputs the false-signal signal which was made to generate the predetermined false-signal signal for carrying out the self-test of the reception function, and was generated to an oscillation / modulator 15, and the false-signal collating machine 25. If the consistency of the false signal which is the false-signal collating machine 25 mentioned later, and is inputted from the false-signal generator 24, and the false signal which received can be judged easily, this false signal may not be a call number currently used for the pager 1, and does not need to be a call number and a signal of the same configuration.

[0027] The oscillation / modulator 15 is equipped with the oscillator which oscillates the signal of the received frequency of a pager 1, and the modulator modulated by the false-signal signal into which the signal which this oscillator oscillates is inputted from the false-signal generator 24, and if a false-signal signal is inputted from the false-signal generator 24, it will output the modulating signal (modulated wave) corresponding to a false-signal signal to a capacitor 16.

[0028] A capacitor 16 outputs only the AC signal of the modulating signal of the false-signal signal inputted from an oscillation / modulator 15 to the antenna section 2.

[0029] Like the above, after the false-signal signal inputted into this antenna section 2 is amplified and detected in RF amplifier 3, a band pass filter 4, a mixer 5, a band pass filter 7, IF amplifier 8, and the FM detector circuit 9, it is minded and is inputted into the change-over machine 21.

[0030] At the time of a self-test, this change-over machine 21 connects the FM detector circuit 9 to the false-signal collating machine 25 with the change-over signal from a control section 23, and outputs the false-signal signal inputted from the FM detector circuit 9 to the false-signal collating machine 25.

[0031] The false-signal signal is inputted into this false-signal collating machine 25 from the false-signal generator 24 as mentioned above. And the false-signal collating machine 25 The false-signal signal by which a direct input is carried out from this false-signal generator 24, The false-signal signal which is generated by the false-signal generator 24 and inputted through an oscillation / modulator 15, a capacitor 16, the antenna section 2, RF amplifier 3, a band pass filter 4, a mixer 5, a band pass filter 7, IF amplifier 8, the FM detector circuit 9, and the change-over machine 21 is compared. Coincidence of these two signals outputs a driving signal to the I/O drive circuit 26.

[0032] When a driving signal is inputted, the I/O drive circuit 26 drives a loudspeaker 13, and makes an information sound output.

[0033] And the self-test switch 14 is connected to the control section 23, and if the self-test switch 14 is turned on, while judging that the self-test was directed and outputting a change-over signal to the change-over machine 22, generating of a false-signal signal is directed in the false-signal generating circuit 24.

[0034] Next, the detail drawing of the antenna section 2 and RF amplifier 3 is shown in drawing 2.

[0035] Namely, the antenna section 2 is equipped with the capacitor C1 and the variable-capacity capacitor C2 which were connected to the both ends of Antenna An and Antenna An, receives the electric wave of the resonance frequency (circuit frequency) adjusted by the variable-capacity capacitor C2, and outputs it to RF amplifier 3.

[0036] RF amplifier 3 is equipped with a coupling capacitor C3, transistors Tr1 and Tr2, and a capacitor C4, and the collector of a transistor Tr1 and the emitter of a transistor Tr2 are connected. The input signal inputted from the antenna section 2 is inputted into the base of a transistor Tr1 through a coupling capacitor C3, and the base of a transistor Tr2 is grounded through the capacitor C4.

[0037] In addition, the capacitor 16 is connected to the connection of Antenna An and a capacitor C1.

[0038] Next, actuation of this example is explained.

[0039] The pager 1 of this example has the description in a place equipped with the self-checking function which carries out the self-test of the reception function.

[0040] Hereafter, it explains based on the flow chart which shows this self-test processing to drawing 3.

[0041] If the self-test switch 14 is thrown in, first, a pager 1 will output a change-over signal to the change-over machine 21, and a control section 23 will switch and connect [ pager ] the FM detector circuit 9 to the false-signal collating machine 25 from the reception circuit 22 (step S2).

[0042] Next, a control section 23 drives the false-signal generator 24, generates a false-signal signal (step S3), and is made to output to an oscillation / modulator 15, and the false-signal collating machine 25 (step S4).

[0043] The modulated wave signal with which the oscillation / modulator 15 inputted the modulated wave of a circuit frequency into the antenna section 2 through the capacitor 16 when the false-signal signal was inputted (step S5), and the antenna section 2 received it is outputted to RF amplifier 3. RF amplifier 3 amplifies an input signal and outputs it to a mixer 5 through a band pass filter 4. It mixes with the signal inputted from the local oscillator 6, and a mixer 5 is outputted to IF amplifier 8 through a band pass filter 7. IF amplifier 8 amplifies the mixed signal inputted, outputs it to the FM detector circuit 9, and the FM detector circuit 9 detects an input signal, and it outputs it to the false-signal collating machine 25 through the change-over machine 21.

[0044] It is confirmed whether the false-signal collating machine 25 compares the false-signal signal inputted from the input signal inputted from the FM detector circuit 9, and the false-signal generator 24 (step S6), and its two signals correspond (step S7).

[0045] The false-signal collating machine 25 is step S7, when an input signal and a false-signal signal are in agreement, it judges that reception was performed normally, drives the I/O drive circuit 26, and makes an information sound output from a loudspeaker 13 (step S8).

[0046] On the other hand, processing is ended as it is, without judging that reception was not performed normally and performing the alarm sound from a loudspeaker 13 at step S7, when an input signal and a false-signal signal are not in agreement.

[0047] Thus, in the pager 1 of this example, if the self-test switch 14 is thrown in, a false signal will be generated by the false-signal generator 24, this generated false signal will be modulated with an oscillation / modulator 15, and it will input into the antenna section 2. The false-signal collating machine 25 compares the input signal by which reception was inputted and carried out to this antenna section 2, and the false signal generated by the false-signal generator 24, if in agreement, sound emission will be carried out [ sound / information ] from a loudspeaker 13, and the purport to which reception was carried out normally will be reported.

[0048] Therefore, the self-test of whether the reception function of the pager 1 which is a radio set simply is normal can be carried out by the false signal, and important information can be received certainly.

[0049] Drawing 4 is drawing showing other examples of the radio set of this invention.

[0050] This example generates a self call number as a signal for self-tests, inputs it into the antenna section, carries out the self-test of the reception function, and applies it to a pager.

[0051] A pager 30 is constituted by an antenna 31, the RF section 32, the decoder section 33, ID-ROM34, the alarm sound section 35, a control section 36, ROM (Read Only Memory)37 and RAM (Random Access Memory)38, the key input section 39, the LCD (LiquidCrystal Display) driver 40, LCD41, and call-number modulated wave generator 42 grade in drawing 4 .

[0052] An antenna 31 receives the call-number modulated wave outputted from the call signal and the call-number modulated wave generator 42 mentioned later transmitted by wireless from the pager service firm outside drawing etc., and outputs it to the RF section 32.

[0053] After the RF section 32 is controlled by the intermittent signal inputted from the decoder section 33, carries out intermittent reception of the call signal inputted from an antenna 31, amplifies this input signal and gets over, it is outputted to the decoder section 33.

[0054] With reference to ID-ROM34 which has registered the call number beforehand, it judges whether the decoder section 33 of the call number of the call signal inputted from the RF section 32 corresponds with a self call number. When the call number of the decoder section 33 which received corresponds with a self call number, it continues reception of the signal by the RF section 32, outputs an alarm sound signal to the alarm sound section 35, makes an information sound output while it outputs the call detecting signal of the purport which had a call in the control section 36, and makes it report that there was a call.

[0055] Moreover, the decoder section 33 outputs the message information received with the call signal to a control section 36 based on the demand inputted from a control section 36.

[0056] The self call number assigned by the pager service firm etc. is usually stored beforehand, and ID-ROM34 compares the call number by which the decoder section 33 was stored as mentioned above in ID-ROM34 with the call number which received, and distinguishes whether it is a self call.

[0057] The alarm sound section 35 consists of amplifier, a loudspeaker, etc., and carries out [ sound / which tells that there was a call with the alarm sound signal inputted from the decoder section 33 / information ] an alarm sound.

[0058] A control section 36 consists of input registers holding the key input actuation in CPU (Central Processing Unit) or the key input section 39 etc., and RAM38 which memorizes ROM37 in which various control programs were stored, the received message information, key input information, etc. is connected.

[0059] ROM37 stores the various control programs and the various system data which a control section 36 performs, and stores the self-test processing program which starts this invention especially.

[0060] A control section 36 controls each part in a pager 30 according to the message information inputted into ROM37 from the decoder section 33 based on the memorized various control programs, and the input indication signal inputted from the key input section 39. For example, RAM38 is made to memorize the received message information, or a message is read from RAM38, and it is made to display on LCD41 by reception.

[0061] RAM38 has the memory area which memorizes the received message information while being used as work-piece memory of a control section 36.

[0062] The key input section 39 is equipped with a ten key, the memory key, the page key, the end key, the self-test key, etc., and outputs directions of each key to a control section 36.

[0063] The LCD driver 40 outputs and displays the character pattern on LCD41 based on the

message information and the various information that it is inputted from a control section 36.

[0064] Next, actuation of this example is explained.

[0065] The pager 30 of this example inserts in a transmitting format of a POCSAG method the self call number by which the control section 36 is stored in ID-ROM34, or ROM37 or RAM38 if the self-test key of the key input section 39 is supplied, and it outputs to the call-number modulated wave generator 42, and the call-number modulated wave generator 42 modulates the inputted call number in a circuit cycle, and inputs a modulated wave into an antenna 31.

[0066] It amplifies and gets over in the RF section 32, the modulated wave inputted into the antenna 31 is outputted to the decoder section 33, and it is confirmed whether the call number of the decoder section 33 in the input signal inputted from the RF section 32 corresponds with the self call number memorized by ID-ROM34. It outputs an alarm sound signal to the alarm sound section 35, and makes an information sound output while it will output a call detecting signal to a control section 36, if the call number which received, and the self call number of the decoder section 33 correspond.

[0067] Therefore, according to the pager 30 of this example, if the self-test key of the key input section 39 is supplied, the modulated wave of a self call number will be generated by the call-number modulated wave generator 42, and the modulated wave of this call number of the generated self will be inputted into an antenna 31. And since an information sound is made to output when the call number which received, and a self call number are in agreement, a comparator circuit, an information circuit, etc. which compare a signal for self-tests are not needed, but with an easy configuration, the self-test of whether the reception function of the pager 30 which is a radio set is normal can be carried out easily, and important information can be received certainly.

[0068] In addition, in each above-mentioned example, although the modulated wave which generated the output of a modulated wave generator in self-tests by connecting with the antenna section is made to input into an antenna, it is not necessary to necessarily connect the output of a modulated wave generator to the antenna section.

[0069] Moreover, needless to say in each above-mentioned example, it is applicable like a cellular phone etc. that it is not what is restricted to a pager although the case where it applied to a pager was explained.

[0070]

[Effect of the Invention] According to invention according to claim 1, by inputting the generated false signal into an antenna and comparing the false signal which received with the antenna with the generated false signal, the self-test of whether the reception function of a radio set is normal can be carried out easily, and important information can be received certainly.

[0071] Moreover, since the self-test of whether the reception function of a radio set is normal by generating the modulated wave of a self call number, inputting into an antenna, and making the usual reception actuation perform can be carried out according to invention according to claim 2, the self-test of whether the reception function of a radio set is normal can be carried out with an easy configuration.

## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The circuit block diagram of the pager which applied one example of the radio set of this invention.



[Drawing 2] The antenna section of drawing 1 , and the detailed circuit diagram of an RF amplifier.

[Drawing 3] The flow chart which shows the self-test processing by the pager of drawing 1 .

[Drawing 4] The circuit block diagram of the pager which applied other examples of the radio set of this invention.

[Description of Notations]

- 1 Pager
- 2 Antenna Section
- 3 RF Amplifier
- 4 Band Pass Filter
- 5 Mixer
- 6 Local Oscillator
- 7 Band Pass Filter
- 8 IF Amplifier
- 9 FM Detector Circuit
- 10 Signal-Processing Section
- 11 Driver
- 12 LCD
- 13 Loudspeaker
- 14 Self-test Switch
- 15 Oscillation/Modulator
- 16 Capacitor
- 21 Change-over Machine
- 22 Reception Circuit
- 23 Control Section
- 24 False-Signal Generator
- 25 False-Signal Collating Machine
- 26 I/O Drive Circuit
- 30 Pager
- 31 Antenna
- 32 The RF Section
- 33 Decoder Section
- 34 ID-ROM
- 35 Alarm Sound Section
- 36 Control Section
- 37 ROM
- 38 RAM
- 39 Key Input Section
- 40 LCD Driver
- 41 LCD
- 42 Call-Number Modulated Wave Generator

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[Translation done.]